Bureau of Standards
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U. S. DEPARTMENT OF COMMERCE
ROY D. CHAPIN, Secretary
BUREAU OF STANDARDS
LYMAN J. BRIGGS, Acting Director

FIBER INSULATING BOARD

COMMERCIAL STANDARD CS42–32

[Issued December 6, 1932]

Effective date for New Production September 15, 1932

A RECORDED STANDARD OF THE INDUSTRY

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1933

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PROMULGATION STATEMENT

On May 16, 1932, at the instance of a group of fiber insulating board manufacturers, a joint conference of representative manufacturers, distributors, and users of fiber insulating board adopted commercial standard CS42–32 for this commodity. The industry has since accepted and approved for promulgation by the Department of Commerce through the Bureau of Standards the commercial standard as shown herein.

The standard became effective for new production on September 15, 1932.

Promulgation recommended.

I. J. Fairchild,
Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Acting Director, Bureau of Standards.

Promulgation approved.

Roy D. Chapin,
Secretary of Commerce.

FIBER INSULATING BOARD

THE STANDARD

PURPOSE

This standard is offered for the common understanding of the fiber insulating board industry. It establishes definite criteria of insulating value and other physical requirements that should be possessed by this material and presents a basis on which performance guaranties may be made by the manufacturer for the guidance and assurance of the prospective home owner, the architect, or builder.

SCOPE

This standard is a minimum specification for two classes of a certain type of fiber insulating board designated as "Insulating building board" and "Roof insulating board."

Insulating building board is used for sheathing, partitions, plaster base, etc., and is governed by requirements of thermal conductivity, water absorption, tensile strength, deflection, minimum thickness, plaster adhesion, expansion, and standard sizes. Roof insulating board is used as the name implies and is governed by requirements of thermal conductivity, water absorption, tensile strength, minimum thickness, and standard sizes.

GENERAL REQUIREMENTS

All fiber insulating board sold as conforming to this commercial standard shall be well manufactured, of uniform thickness, with straight cut edges, and packed in such manner that it reaches the user in a clean and serviceable condition.

DETAIL REQUIREMENTS

Commercial standard insulating board shall comply with the detail requirements shown in Table 1 when tested according to methods hereinafter described.

TABLE 1

Requirements	Insulating building board	Roof insulating board
Maximum thermal conductivity. Btu. per hour, per square foot, and per °F. per inch thickness	0.36	0.36
Minimum thickness, inch	0.406 (13/32)	0.406 (13/32)
Maximum water absorption, per cent by volume	5	10
Minimum average tensile strength, pounds per square inch	175	100
Maximum deflection, inch	0.1	----------
Minimum plaster adhesion, pounds per square foot	600	----------
Maximum linear expansion, per cent	½	----------
Standard stock sizes	(Boards (feet): 4 by 6, 4 by 7. 4 by 8, 4 by 9. 4 by 10, 4 by 12. Lath (inches): 16 by 48. 18 by 48. 24 by 48.	*Inches* 22 by 47. 24 by 47. 24 by 60. 30 by 47.

METHODS OF TEST

Sampling.—Samples shall be taken at random so as to give a fair representation of the entire shipment. Pieces from five boards of any carload, or one-half of 1 per cent of the number of pieces in less-than-carload shipments, but not less than three boards of any shipment, shall constitute the standard sample.

Thermal conductivity.[1]—The thermal conductivity of fiber insulating board shall be determined in accordance with the Standard Test Code for Heat Transmission Through Walls (Part II, Conductivity of Homogeneous Materials), as adopted by the American Society of Heating and Ventilating Engineers, January, 1928,[2] with the exception that the mean temperature for test shall be 75° F. instead of 60° F.

For the purpose of calculating thermal conductivity the distance between the test plates shall be taken as the thickness of the sample.

Thickness.—Thickness shall be determined from 12 by 12 inch samples measured with a micrometer to an accuracy of 0.01 inch. The contacting surfaces of the micrometer shall have a diameter of approximately one-fourth inch, and care should be exercised so that the sample is not deformed when the thickness is measured.

Twelve readings shall be taken inside the edge of the sample at points 3 inches apart and the average reported as the thickness of the sample.

Water absorption.—A sample 12 by 12 inches shall be conditioned to constant weight by holding in an atmosphere at 70° F. and 32 per cent relative humidity maintained by a saturated solution of magnesium chloride ($MgCl_26H_2O$). The thickness of the sample shall be measured and the volume calculated therefrom. The sample shall then be weighed and submerged horizontally under 1 inch of distilled water maintained at a temperature of 70° F. plus or minus 5° F. After two hours of submersion, the sample shall be stood on end to drain for 10 minutes, at the end of which time the excess surface water shall be removed by hand with a blotting paper or paper towel. The sample shall again be weighed, the volume of absorbed water calculated, and the water absorption expressed in per cent by volume based on the initial volume.

Tensile strength.—The test for tensile strength shall be as follows: From each air-dried sample, specimens 4 inches wide and not less than 10 inches long shall be clean cut with a sharp knife. Half of the samples shall be parallel to the longest direction of the board and the other half at right angles thereto. They shall be tested on a tensile testing machine that complies with the requirements of the

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[1] The committee on heat transmission sponsored by the National Research Council is preparing a code for the measurement of the thermal conductivity of insulating and building material which when approved will supersede the methods given herein.

[2] *Part II. Conductivity of homogeneous materials (A. S. H. V. E. Codes).*—The guarded hot plate shall be the standard method for determining the conductivity of homogeneous materials. This method is not applicable to the determination of over-all heat-transmission coefficients. The construction of apparatus and the procedure recommended by the Bureau of Standards, J. Am. Soc. Heating and Ventilating Engrs., vol. 26, No. 7, October, 1920, shall be followed and the temperature of the surfaces of the materials shall be regarded as that of the plates in each side. The test specimen shall be at least 8 by 8 inches and the plates must be applied in such a manner that the density and other physical characteristics of the material under test are not altered. Temperature equilibrium shall have been established for a sufficient length of time to insure constant conditions before test data are taken.

In order that results from different laboratories may be comparable, the standard method of making tests shall be at a mean temperature of 60° F. and upon dry material. The material shall be dried at a temperature of 220° F. for a sufficient length of time to eliminate all moisture before the test is made and the per cent of moisture driven off, to gether with the atmospheric conditions and the density of the material, shall be reported with the test.

Standard Methods of Verifications of Testing Machines, Designation E–4–27 A. S. T. M. Standards, Part I, 1930, page 914.[3]

The distance between clamps shall be not less than 6 inches. Specimens under test that break within one-half inch of the jaws shall not be considered. The machine speed shall be such that the load is applied at the rate of 2 inches per minute.

The specimens before being placed in the testing machine shall be calipered for width and thickness to the nearest 0.01 inch. The maximum breaking load shall be divided by the cross-sectional area obtained to ascertain the strength of the material in pounds per square inch. The acceptance value shall be based on the average of all tests.

Deflection test.—Deflection shall be determined from specimens placed on horizontal parallel supports 8 inches apart and loaded at

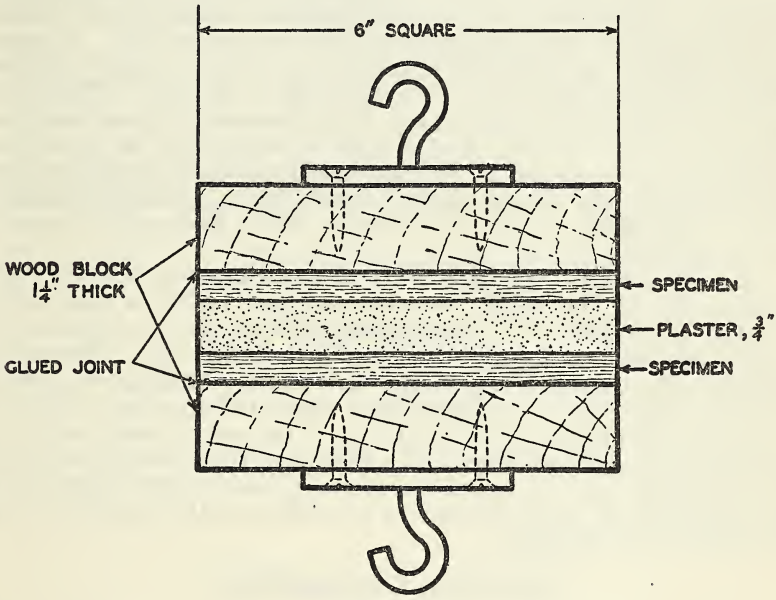

FIGURE 1

midspan with a 10-pound weight, the bearing of which shall be parallel to the end supports. The bearing and supports shall be rounded to a three-eighths inch radius to prevent injury to the specimen.

Test specimens 4 by 12 inches that have been cut from the longest direction of the board and at right angles thereto shall be placed on the supports and a 10-pound load shall be applied at midspan. After a period of 30 seconds the deflection at the center shall be measured with a standard strain gage graduated to read 0.001 inch.

Plaster adhesion.—The test for plaster adhesion shall be made as in Figure 1, with two wooden blocks 6 inches square, 1¼ inches thick, and supplied with hooks in the center as indicated. A 6-inch square specimen is glued to the face of each block and may be further secured with several 6d nails.

[3] The error for loads in the loading range shall not exceed plus or minus 1.0 per cent for new machines or plus or minus 1.5 per cent for used machines.

A mixture of fresh gypsum plaster containing not more than 2 per cent lime with 1 part plaster and 2 parts clean, sharp sand with sufficient water to make a workable mixture is then applied to the face of each specimen to a thickness of approximately three-eighths inch. The two faces of the fresh plaster are then worked and forced together to make a good bond and trimmed flush with the specimen.

The plaster is allowed to set for a period of 7 days in an atmosphere with a relative humidity between 50 and 80 per cent. A load is then applied at the hooks by means of a standard tensile testing machine until separation occurs.

Linear expansion.—The maximum linear expansion shall be determined from samples 3 by 12 inches, half of which have been cut from the longest direction of the board and the other half at right angles thereto. The samples shall be conditioned at 32 per cent relative humidity, maintained by a saturated solution of magnesium chloride ($MgCl_26H_2O$) at a temperature between 70° and 80° F. At points approximately 8 inches apart, and on a line drawn through the linear center of the sample, two metal studs shall be inserted. These may be three-sixteenths or one-quarter inch threaded studs of sufficient length to allow a thin nut and washer to be attached on either side, and still allow projection of approximately one-quarter inch on both sides of the board. In the center of each stud a point shall be made with a sharp drill, to serve as reference marks from which measurements are taken.

After these studs have been installed, measurements shall be taken on both sides of the board, with a strain gage, having a dial reading to 0.001 of an inch. The measurements from the two sides of the sample shall be averaged to determine the initial length. The sample shall then be subjected for 24 hours to a relative humidity of approximately 93 per cent maintained by a saturated solution of primary ammonium phosphate ($NH_4H_2PO_4$). The sample shall again be measured as above indicated, again averaging the measurements from the two sides, and the results shall be given in percentage of the dimensions at 32 per cent relative humidity for the sample showing the maximum expansion.

GENERAL CONFERENCE

At the request of a group of manufacturers of fiber insulating board, a general conference of manufacturers, distributors, and consumers of the product was held in Chicago, Ill., May 16, 1932, at which time the standard was approved and recommended for the acceptance of the entire industry.

The following guarantee statement, which was approved by the conference, may be used to denote conformity to the requirements of the commercial standard:

CERTIFIED INSULATION

This Fiber Insulating Board
is Guaranteed by
---------- Company
to meet all the requirements of
Commercial Standard CS42–32 for
Fiber Insulating Board
as issued by
U. S. Department of Commerce
Washington, D. C.

The conference approved application of the certification plan, which provides for the listing of those companies who are prepared to certify that their board meets the commercial standard.

The standard became effective September 15, 1932, and since no definite interval was fixed for its revision, this matter was left to the standing committee of the industry, which includes the following:

Frank B. Rowley (chairman), president, American Society of Heating and Ventilating Engineers; professor of mechanical engineering, University of Minnesota, Minneapolis, Minn.
G. C. Denebrink, Armstrong Cork & Insulating Co., Lancaster, Pa.
R. T. Miller, Masonite Corporation, Chicago, Ill.
T. B. Munroe, The Celotex Co., Chicago, Ill.
E. W. Morrill, Insulite Co., Minneapolis, Minn.
E. W. Davis, Wood Conversion Co., Cloquet, Minn.
L. F. Johnson, U. S. Gypsum Co., Chicago, Ill.
F. Leo Smith, technical secretary, structural service department, American Institute of Architects, Washington, D. C.
M. S. Van Dusen, Bureau of Standards, Washington, D. C.
R. E. Backstrom, National Committee on Wood Utilization, Washington, D. C.
J. C. Peebles, professor of experimental engineering, Armour Institute of Technology, Chicago, Ill.
Adolph Pfund, secretary-manager, National Retail Lumber Dealers Association, Chicago, Ill.
S. Percy Thompson (representing National Retail Lumber Dealers Association), 616 Rhode Island Avenue NE., Washington, D. C.
George Landis Wilson, commissioner, Roofing Contractors Association of Cook County, Chicago, Ill.
Harry H. Steidle, ex officio secretary, Bureau of Standards, Washington, D. C.

ACCEPTANCE OF COMMERCIAL STANDARD

This sheet properly filled in, signed, and mailed to the address indicated will provide for the recording of your organization as an acceptor of the commercial standard.

Date _____

DIVISION OF TRADE STANDARDS,
BUREAU OF STANDARDS,
Washington, D. C

GENTLEMEN: Having considered the statements on the reverse of this sheet we hereby record our acceptance of the commercial standard as our standard practice in the {production[1] / distribution[1] / use[1]} of fiber insulating board for one year beginning _____ or until the present standard is revised.
(Date)

Realizing that the value of any commercial standard depends upon the amount of active support it receives, we will use such effort as may be appropriate to secure additional adherence whenever the opportunity offers.

Furthermore, we plan to cooperate with the standing committee in every reasonable way to assist it in the intelligent consideration of constructive revisions to be presented for adoption in accordance with established commercial standards procedure.

(Cut on this line)

Signature _____
(Above signature should be in ink)

(Kindly typewrite or print the following lines)

Title _____

Company _____

Street address _____

City and State _____

[1] Please designate which group you represent by drawing lines through the other two. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "In principle" should be added after the signature.

TO THE ACCEPTOR

The following points are given in answer to the usual questions arising in connection with the acceptance form:

1. Commercial standards are commodity specifications voluntarily established by mutual consent of the industry. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the industry as a whole, their provisions through usage soon become established as trade customs.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard, and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The department's responsibility.*—The function performed by the Department of Commerce in the establishment of a commercial standard is fourfold: First, to act as an unbiased coordinator to bring all branches of the industry together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard; and fourth, to add all possible prestige to the enterprise by publication and promulgation when accepted by the industry.

When the standard has been indorsed by companies representing a satisfactory majority of production, the success of the project is announced. If, however, in the opinion of the standing committee of the industry or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

ASSOCIATIONS

American Institute of Architects, Alabama Chapter, Birmingham, Ala.
American Institute of Architects, Structural Service Department, Washington, D. C.
American Institute of Architects, San Antonio, Tex.
American Specifications Institute, Chicago, Ill.
California Retail Lumbermen's Association, Garden Grove, Calif.
Columbia Builders Exchange, Columbia, S. C. (in principle).
Florida Lumber and Millwork Association, Orlando, Fla.
Lumbermens' Association of Texas, Houston, Tex.
Mountain States Lumber Dealers Association, Denver, Colo.
National Association of Builders' Exchanges, Washington, D. C.
National Association of Building Owners and Managers, Chicago, Ill.
National Committee on Wood Utilization, Washington, D. C. (in principle).
National Retail Lumber Dealers Association, Chicago, Ill.
Ohio Association of Retail Lumber Dealers, The, Xenia, Ohio.
Virginia Lumber and Building Supply Dealers Association, Richmond, Va. (in principle).
Western Retail Lumbermans Association, Spokane, Wash. (in principle).
Wisconsin Retail Lumbermens Association, Milwaukee, Wis.

FIRMS

Adams Lumber Co., George, Inwood, Long Island, N. Y.
Allen Lumber Co., Peoria, Ill.
Alter Lumber & Supply Co., Alma, Nebr.
Anderson Lumber Co., Ogden, Utah.
Antrim Lumber Co., St. Louis, Mo.
Armstrong Cork & Insulation Co., Lancaster, Pa.
Baker, Vogel & Roush, Seattle, Wash. (in principle).
Baldridge Lumber Co., J. C., Albuquerque, N. Mex.
Bayne Lumber Co., L. M., Ottawa, Ill.
Beaver Falls Planing Mill Co., Beaver Falls, Pa.
Beckwith Lumber Co., H. E., Chetek, Wis.
Bennett Lumber Co., Kansas City, Mo.
Berkshire Lumber Co., Pittsfield, Mass.
Blackstock Lumber Co., Seattle, Wash.
Botsford Lumber Co., Winona, Minn.
Brown Lumber Co. (Inc.), Dan, Anderson, S. C.
Buchanon & Smock Lumber Co., Asbury Park, N. J.
Building Investment, New York, N. Y. (in principle).
Carstens Bros., Ackley, Iowa.
Case Lumber Co., John B., Flemington, N. J.
Cedar Lumber & Hardware Co., Cedar City, Utah.
Celotex Co., The, Chicago, Ill.
Certain Lumber Co., W. N., Neodesha, Kans.
Certain-Teed Products Corporation, New York, N. Y.
Charlottesville Lumber Co., Charlottesville, Va.
Chase & Co. (Inc.), C. P., Springfield, Mass.
Clark County Lumber Co., The, Springfield, Ohio.
Cockrum Lumber Co., Knoxville, Tenn.
Colburn Lumber & Fuel Co., Green Bay, Wis.
Corddry Co. (Inc.), The, Snow Hill, Md.
Costello Lumber Co., James, Liberty, Mo.
Cottonwood Lumber Co., Cottonwood, Ariz.
Cowan Lumber Co., Mobile, Ala.
Creith-Potter Lumber Co., The, Columbus, Ohio.
Crystal Refrigerator Co., Fremont, Nebr.
Detroit Edison Co., The, Detroit, Mich.
Dix Lumber Co., North Cambridge, Mass.
Economy Lumber Co. (Inc.), Christiansburg, Va.
Elgin Lumber Co., Elgin, Ill.
Frey Planing Mill Co., The, Louisville, Ky.
Frigidaire Corporation, Dayton, Ohio.
Gay Engineering Corporation of California, Los Angeles, Calif.
Goldberg & Son, A. L., Nashville, Tenn.
Guernsey-Westbrook Co., The, Hartford, Conn. (in principle).
Hallack & Howard Lumber Co., The, Denver, Colo.
Hamilton Lumber Co., The, Hamilton, Ohio.
Hansen Lumber Co., H. L., Galesburg, Ill.

Haskelite Manufacturing Corporation, Chicago, Ill.
Hawaiian Cane Products (Ltd.), San Francisco, Calif.
Hawkins Companies (Inc.), Boston, Mass.
Heinz & Munschauer, Buffalo, N. Y.
Hinckley & Son Co., John, Yarmouthport and Hyannis, Mass.
Hoffman & Baldwin, West Chester, Pa.
Hunt Co., Robert W., Chicago, Ill. (in principle).
Hunter Lumber Co., Chillicothe, Ill.
Insulite Co., The, Minneapolis, Minn.
Interstate Lumber Co., Missoula, Mont.
Iowa Builders Supply Co., Cedar Rapids, Iowa.
Johns-Manville Sales Corporation, New York, N. Y.
Koch Butchers' Supply Co., North Kansas City, Mo.
Kenosha Lumber & Coal Co., Kenosha, Wis.
Lambert Lumber Co., Leavenworth, Kans.
Lander Lumber Co., El Paso, Tex.
Littlefield Lumber Co., Portsmouth, N. H.
Loehr Lumber Co., The Harvey, Canton, Ohio.
Loizeaux Lumber Co., J. D., Plainfield, N. J.
Lorillard Refrigerator Co., The, Kingston, N. Y.
Luhring Lumber Co., Evansville, Ind.
Lumber & Millwork Co. of Philadelphia, The, Philadelphia, Pa.
Lumber Buyers Publishing Corporation, Chicago, Ill. (in principle).
Lumbermen's Exchange of the City of Philadelphia, The, Philadelphia, Pa.
Maizewood Products Corporation, Dubuque, Iowa.
Markland Co., M. B., Atlantic City, N. J.
Masonite Corporation, Chicago, Ill.
Maysville Lumber Co. (Inc.), Maysville, Ky.
Meyer Lumber Co., Platteville, Wis.
Midwest Lumber Co., Dubuque, Iowa.
Miller & Yeager, Terre Haute, Ind.
Moore Drydock Co., The, Oakland, Calif. (in principle).
Morrison-Merrill & Co., Salt Lake City, Utah.
Mutual Service Co., Louisville, Ky.
National Gypsum Co., Buffalo, N. Y.
National Refrigerator & Fixture Co. (Inc.), New Orleans, La.
National Refrigerators Co., St. Louis, Mo.
Nicetown Manufacturing Co. (Inc.), Philadelphia, Pa.
Noll-Welty Lumber Co., Kansas City, Mo.
North Hudson Manufacturing Co., North Bergen, N. J.
O'Keefe & Merritt Co., Los Angeles, Calif.
Pantasote Co. (Inc.), The, New York, N. Y.
Ranney Refrigerator Co., Greenville, Mich.
Restrick Lumber Co., Detroit, Mich.
Robinson Co., The C. M., Cincinnati, Ohio.
St. Louis Lumber Co., St. Louis, Mo.
Searle & Chapin Lumber Co., Lincoln, Nebr.
Smoot-Holman Co., Inglewood, Calif.
Solie Lumber Co., Janesville, Wis.
South Side Lumber & Supply Co., The, Toledo, Ohio.
Sowers-Benbow Lumber Co., The, Columbus, Ohio.
Specification Record, Chicago, Ill.
Standard Lumber Co., Spokane, Wash.
Stevens' Master Specifications, New York, N. Y.
Stewart Inso Board Corporation, St. Joseph, Mo.
Stewart Lumber Co., A. P., Thermopolis, Wyo.
Stockton Lumber Co., Stockton, Calif.
Strong & Hale Lumber Co., The, Portland, Conn.
Swan Creek Lumber Co., The, Toledo, Ohio.
Thompson Lumber Co., Minneapolis, Minn.
Tuttle Bros. (Inc.), Westfield, N. J.
United States Gypsum Co., Chicago, Ill.
Velde Lumber Co. (Inc.), Pekin, Ill.
Vickere Lumber Co., T. W., Sheridan, Wyo.
Wearn Lumber Co., J. H., Charlotte, N. C.
Western Lumber Co. of San Diego, San Diego, Calif.
White Lumber Co., The R. B., Granville, Ohio.
Wilbur Lumber Co., West Allis, Wis.
Wildgen Lumber Co., Hoisington, Kans.
Wood & Son, Edw. J., Clarksburg, W. Va.
Woodbridge Lumber Co., Woodbridge, N. J.
Wood Conversion Co., Cloquet, Minn.

GOVERNMENT

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U. S. Department of the Treasury, Washington, D. C.
U. S. War Department, Washington, D. C.
Veterans' Administration, Washington, D. C.

COMMERCIAL STANDARDS

CS No.	Item
0-30.	The commercial standards service and its value to business.
1-32.	Clinical thermometers (second edition).
2-30.	Mopsticks.
3-28.	Stoddard solvent.
4-29.	Staple porcelain (all-clay) plumbing fixtures.
5-29.	Steel pipe nipples.
6-31.	Wrought-iron pipe nipples (second edition).
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24-30.	Standard screw threads.
25-30.	Special screw threads.
26-30.	Aromatic red-cedar closet lining.
27-30.	Plate-glass mirrors.
28-32.	Cotton-fabric tents, tarpaulins, and covers.
29-31.	Staple seats for water-closet bowls.
30-31.	Colors for sanitary ware.
31-31.	Red-cedar shingles.
32-31.	Cotton cloth for rubber and pyroxylin coating.
33-32.	Knit underwear (exclusive of rayon).
34-31.	Bag, case, and strap leather.
35-31.	Plywood (hardwood and eastern red cedar).
36-31.	Fourdrinier wire cloth.
37-31.	Steel bone plates and screws.
38-32.	Hospital rubber sheeting.
39-32.	Wool and part-wool blankets.
40-32.	Surgeons' rubber gloves.
41-32.	Surgeons' latex gloves.
42-32.	Fiber insulating board.
43-32.	Standard grading of sulphonated (sulphated) oils, saponifiable types (in preparation).
44-32.	Apple wraps (in preparation).

NOTICE.—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice in their industry, may secure copies of the above standards, while the supply lasts, by addressing the Division of Trade Standards, Bureau of Standards, Washington, D. C.

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